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PORTABLE EQUIPMENT FOR APPLYING INSECTICIDAL CONCENTRATES BY ATOMIZATION

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Portable equipment for producing unusually fine spray atomization was needed by the writers in applying concentrated spray mixtures and oils to small trees and to corn plants. Standard equipment was not suitable, since the spray was not sufficiently atomized and the nozzles often clogged.

Equipment was assembled which proved satisfactory for this purpose. A 3/4-hp. gasoline engine, an air compressor, and an air tank to avoid pressure pulsations were mounted on a flat metal base 10 inches wide and 28 inches long. The metal base was then mounted on a metal wheelbarrow chassis. Above the wheel a shelf was built, to which a spray material tank of 2-gallon capacity was fastened. The wheelbarrow chassis was so constructed that the engine-compressor unit was parallel with the ground and was sufficiently low so that the engine could be started with the foot crank. This assembly is shown in figure 1. The equipment supplied a steady air pressure of 60 pounds at the tank. The pressure at the nozzle was about 50 pounds.

The nozzle consisted of a paint gun (fig. 2) and was connected with the material tank by two 50-foot lengths of $\frac{1}{4}$-inch hose, one conveying liquid and the other conveying air to the nozzle. The paint-gun nozzle released liquid through an aperture 1 millimeter in diameter, while air was released through two apertures each 7/8 millimeter in diameter. Atomization was accomplished by the two streams of air intersecting the stream of liquid at angles of about 45 degrees. The paint gun was handled directly when insecticides were applied to corn, or was mounted on an extension rod when insecticides were applied to trees (fig. 3). In the latter case a wire extending from the trigger of the gun to the bottom of the extension rod served to release the spray.

The output of water by this nozzle was at the rate of 8 gallons per hour. This equipment was particularly suitable for distributing lead arsenate concentrate consisting of 1 part by weight of lead arsenate, 5 parts of water, and 0.2 part of oil.

This was delivered at the rate of about 7½ gallons per hour. Concentrates containing as high as 1 part of lead arsenate to 1.2 parts of water were atomized successfully when a wetting agent was added.

Sprays delivered by this equipment consisted of very minute droplets, and foliage could be covered with an inconspicuous application of lead arsenate spray at the rate of from 1,000 to 1,200 droplets per square inch of surface. No plant injury resulted from such applications. The efficiency of this equipment in delivering spray when low growth is being treated is shown in the following comparison:

Method of application	Number of men to operate	Pounds of pressure	Acres sprayed per 8-hour day
Knapsack sprayer	1	50	1/8 to 1/4
Wheelbarrow sprayer (hand operated)	2	150	2/3 to 1½
Portable pressure equipment (fig. 1)	2	50	6

To prevent clogging of the small aperture in the nozzle, any trash or exceptionally coarse materials in the mixture should be removed. This was accomplished by straining concentrates of lead arsenate, calcium arsenate, or cryolite through a 60-mesh screen, and concentrates of derris powder through a 40-mesh screen. The lighter oils can be atomized successfully, but heavy oils must be thinned (as with acetone) or applied as emulsions. Ordinary spray mixtures can also be applied with this equipment.

The use of special equipment, such as described above, makes possible the application of concentrated sprays, which have several important advantages over ordinary sprays. A given volume of spray material will cover a much greater leaf area or acreage because much less water is used and because a larger proportion is actually deposited on the plants. Because the quantity of liquid applied per unit of leaf surface is small, there is no loss by run-off, such as occurs with ordinary sprays. Less pumping and pressure and less liquid and labor per acre are required. Time is saved in refilling the sprayer, and more rapid coverage of an area can therefore be obtained.

The method described has even greater advantages over dusting. The initial deposit ranged from 2.3 to 7 times as great as for dusting. After exposure to rain the adherence was much better than in the case of dusts. None of the concentrated spray is blown off the foliage, whereas air movement will remove a considerable portion of the initial dust deposit. Winds of velocity up to 12 miles per hour do not interfere with the application of concentrates, and therefore spraying may be done during a larger proportion of the available time.

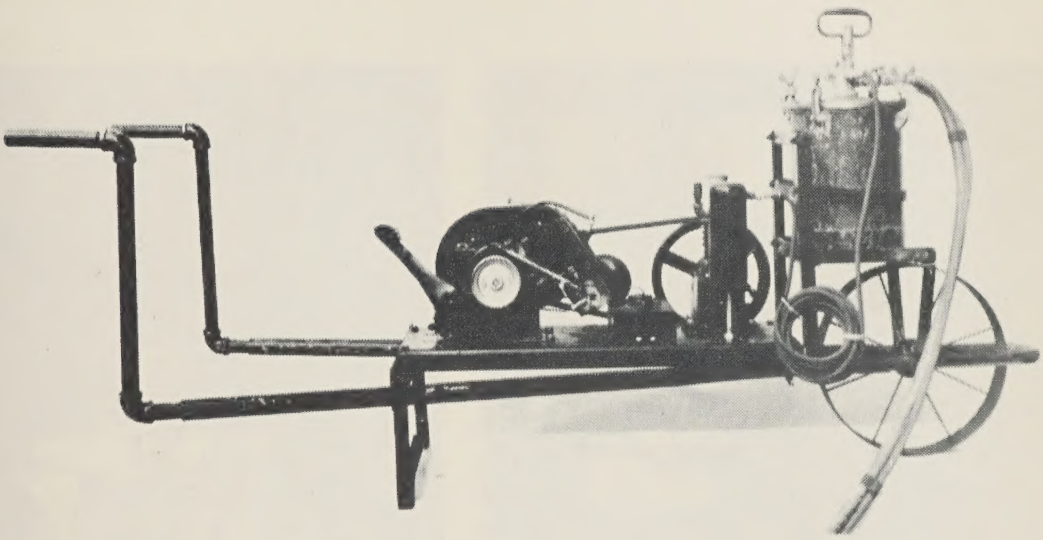

Figure 1.--Wheelbarrow assembly of equipment for atomization of sprays, showing wheelbarrow chassis, gasoline engine, compressor, air tank, and material container.

Figure 2.--Paint-gun nozzle.

Figure 3.--Nozzle attached to extension rod, showing method of operation.